Marked Up Version of Substitute Specification

RETROFIT KIT FOR MOTORIZING A COLLAPSIBLE MINI SCOOTER

CROSS-REFERENCE TO RELATED APPLICATION

[0001] The present invention claims the priority date of a prior filed provisional patent application having serial No. 60-240548, and official filing date of Oct. 12, 2000, and which discloses substantial similar matter as described herein.

BACKGROUND OF THE INVENTION

FIELD OF INVENTION

[0002] The present invention is directed to a collapsible motorized mini scooter, a retrofit motorized unit in kit form for a mini scooter.

~~BACKGROUND OF THE INVENTION~~ DESCRIPTION OF THE RELATED ART

[0003] During the past few years, the lightweight collapsible mini scooter has become very popular in the market place. The scooter is very durable and very compact when folded up. The steering tube can be collapsed[[;]], the handle grips folded and the unit can be placed in a bag and carried over one's shoulder. Children, teenagers and some adults use the mini scooter today. A motorized unit for these existing scooters would be a great added value and enjoyment for existing scooter owners, as long as it comes in a kit form and is easy to install with minimum skills and equipment.

SUMMARY OF INVENTION

[0004] The invention is embodied in a kit form converting a non-motorized mini scooter into a motorized scooter which does not damage the original scooter construction by drilling, machining or breaking any of the ~~scooters~~ original parts of the scooter. The kit will provide all the components to convert and motorize

the mini scooter: ~~Motor~~ motor, batteries, charging system and hardware for installation.

[0005] Power to the motor will begin when the rider engages a switch ~~forward motion~~, which sends current to a relay, which in turn sends current to the motor, ~~and directs~~ the motor thereby driving a rear wheel causing forward motion of the scooter. When the rider releases the switch, the current is discontinued. The drive is engaged by a positive lock lever or thumbscrew mounted with the motor bracket[[,]]. A NiCad battery pack ~~NiCad~~ and the required relay are in a cavity located underneath a footrest platform. ~~Motor~~ The motor bracket is placed where an existing fender is located by replacing the fender with the bracket and the motor. In turn, the fender is then placed on the motor bracket. ~~Motor~~ The motor is activated by a button switch mounted on the scooter handle bar and ground current to the relay is sent through a rotating contact shoe on an adjustable handle bar tube, or an optional remote system ~~on some units are provided which use~~ that uses a transmitter on the ~~handles~~ handle grips and an additional receiver located in the battery cavity[[,]]. ~~and a~~ A cam lock motor bracket adjuster is used as well as a foot lock motor adjuster. The forward motion is obtained by a small spindle located on the electric motor shaft, which comes in contact with the rear wheel.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] FIG. 1 is a side view of ~~motorized kit installed on~~ a razor type mini scooter.

[0007] FIG. 2 is ~~the lower cavity for battery storage rotating cup and battery tray~~ a side view of the scooter shown in Fig. 1 with the retrofit kit according to the present invention installed.

[0008] FIG. 3 is ~~present invention~~ a perspective view of the retrofit kit contents, including battery tray, isolator ring, contact shoe, and motor bracket thumbscrew.

[0009] FIG. 4 is ~~the motor bracket with thumbscrew and pivot pin~~ a perspective view of the collar shown in Fig. 3.

[0010] FIG. 5 is ~~the adjusting pivot pin~~ a perspective view of the motor bracket with thumbscrew shown in Fig. 3.

[0011] ~~FIG. 6 activating foot brake.~~

[0012] ~~FIG. 7 activating foot brake.~~

[0013] ~~FIG. 8 represents clip on retrofit rotating contact shoe.~~

[0014] ~~FIG. 9 represents the pre-production motor bracket.~~

[0015] ~~FIG. 10 represents the motor bracket with different fender options.~~

[0016] ~~FIG. 11 represents the rotating contact collar.~~

[0017] ~~FIG. 12 represents scooter foot platform.~~

[0018] ~~FIG. 13 represents spring instead of thumbscrew.~~

[0019] ~~FIG. 14 represents complete kit in box form for consumer purchase.~~

[0020] ~~FIG. 15 represents butterfly bracket with motor and isolator collar, start stop, charger, spring installer tool, pin tool, wiring system and battery tray.~~

DETAILED DESCRIPTION OF THE INVENTION

[0021] While the present invention is susceptible of embodiment in various forms, there is shown in the drawings and will hereinafter be described the presently preferred embodiments of the invention with the understanding that the present ~~disclosures~~ disclosure is to be considered as an exemplification of the invention and it is not intended to limit the invention to the specific embodiments illustrated.

[0022] The invention is embodied in a kit for converting a non-motorized scooter into a motorized scooter which does not damage the original scooter's construction by drilling, machining or breaking any of the scooter's original parts. Referring to ~~FIGS. 1 and 2~~ Fig. 1, a non-motorized scooter **1** for use with the kit **51** (Fig. 3) of the present invention includes a base platform **3** which is stepped upon by the rider when the scooter **1** is in use. The scooter **1** also includes a head tube **15**, which attaches to the front of the base platform **3** by a hinge assembly **21**. The hinge assembly **21** permits the head tube **15** to rotate approximately 90

degrees from a reclined position for storage, to an extended position for use. The hinge assembly **21** preferably includes a hinge lock **23** for locking the head tube **15** in either a reclined or extended position. Telescoping through the head tube **15** is a steering column **7** including an upper tube **9** and a lower tube **11**. The steering column **7** is ~~rotably~~ rotatably attached to the head tube **15** using bearings **17**, which are mounted to the top and bottom interior of the head tube **15**. Preferably, the upper tube **9** is slidably telescopic within lower tube **11** and can be locked in various vertical ~~position~~ positions using a clamp lock **19**. At the top of the steering column **7** are horizontally extending handlebars **5** which enable the rider to rotate the steering column **7** by manual rotation of the handlebars **5**. Affixed at the bottom of the steering column **7** is a front fork **25**. ~~Rotably~~ Rotatably mounted by a front axle **29** to the front fork **25** is a front wheel **27**.

[0023] At the rear of the scooter **1** is a rear fork **31**, which extends rearwardly from the rear of the base platform **3**. The rear fork **31** is applied to a laterally extending rear axle **35**, which ~~rotably~~ rotatably mounts the scooter's rear wheel **33**. Preferably, the scooter **1** also includes a rear fender foot ~~break~~ brake **37**. The fender foot ~~break~~ brake **37** is ~~hingably~~ hingedly attached to the front of the rear fork **31** by a pin, or a screw and nut combination, which extends laterally through two holes **41** formed in the rear fork **31** and two corresponding holes formed at the front of the fender foot ~~break~~ brake **37**. The fender foot break **37** is biased upwardly by a spring (not shown) ~~39~~. In use, a rider of the scooter **1** depresses the fender foot ~~break~~ brake **37** against the rear wheel **33** to inhibit the wheel's rotation and cause braking of the scooter **1**.

[0024] The scooter **1** of the prior art provides a lightweight collapsible structure, which is driven by a user by a push-and-go method in which a rider uses one of his feet to propel the scooter which is ridden by balancing on the rider's other foot. Referring to all of the Figs. 2-5 ~~figures~~, and particularly Fig. ~~FIG.~~ 3, the kit **51** of the present invention is directed to converting the non-motorized scooter of the prior art into a motorized structure **50**. The kit **51** includes a bracket **53** (best

shown in Fig. 5 ~~FIG. 9~~), a motor **59** and an additional fender foot ~~break~~ brake **63** already affixed to the bracket **53**. Referring to Fig. 5 ~~FIG. 9~~, to this end, the bracket **53** includes a pair of top holes **57** for ~~hingably~~ hingedly affixing the fender foot ~~break~~ brake **63** using a pivot pin passing through the top holes **57** and corresponding holes formed at the front extremity of the fender foot ~~break~~ brake **63**. Meanwhile, the motor **59** is affixed to the bracket **53** using typical fasteners at motor mount holes **60**. A larger aperture **62** is formed in the bracket **53** through which a spindle **61** of the motor **59** extends.

[0025] In a preferred embodiment, the kit **51** for converting the scooter **1** into a motorized scooter **50** includes a low torque motor having a twenty-seven winding, single strand armature. For a preferred embodiment for creating a high performance scooter, the motor **59** includes a fourteen winding, three strand armature. The motor **59** also preferably includes internal bearings for withstanding forces imparted upon the motor's spindle **61**. Suitable motors are available from Mabuchi Motor in Japan.

[0026] The kit **51** of the present invention also includes a battery pack **71** including a plurality of batteries **75** for providing electrical power to the motor. In a first preferred construction, the battery pack **71** includes twelve 1.2 volt rechargeable batteries. The batteries are wired to provide two sets of six 1.2 volt batteries wired in series, with each set of six batteries wired parallel to provide a battery pack **71** providing 7.2 volts. In a second preferred embodiment, the battery pack **71** includes fourteen 1.2 volt rechargeable batteries for providing additional torque. The batteries are wired to provide two sets of seven 1.2 volt batteries wired in series, with each set of seven batteries wired in parallel to provide a battery pack providing 8.4 volts. Providing protection for the battery pack **71** is a battery tray **73** which is affixed to the scooter **1** using Velcro attachment **77** or the like.

[0027] The battery pack **71** is connected to the motor **59** using relative high current wires **84** which extend from both the battery pack **71** and motor **59** and are

connected using male and female connectors **79** and **81**. The flow of current from the battery pack **71** to the motor **59** is controlled using a control circuit **85** which includes a high current relay **83** controlled by a switch constructed as an on/off button **99**. Numerous suitable relays are available to those skilled in the art. However, a twelve-volt relay typically used to control the headlamps of automobiles ~~have~~ has been found to be particularly acceptable. The on/off button **99** is connected to the relay **83** through a pair of signal wires **87** and **89**, which are, in-turn, connected by a contact strip **91** and a contact bar **95** in contact with the contact strip **91** by a circular collar **105**.

[0028] The kit **51** of the present invention preferably includes [[a]] numerous minor attachments means for attaching the signal wires **87** and **89** to the scooter **1** such as cable ties **103** or mounting bases **101** having an adhesive backing. The above-described kit **51** provides all of the components necessary for transforming a typical prior art non-motorized scooter **1** into a motorized scooter **50**, which can be installed in only a few minutes using only a hammer and a screwdriver, the assembly of which will not damage the original scooter in any way.

[0029] Again with reference to all of the figures, to convert the non-motorized scooter **1** into a motorized construction **50**, the original fender foot ~~break~~ brake is removed by removing the preexisting pivot pin **43**. In place of the preexisting fender foot ~~break~~ brake, the bracket **53** is affixed to the scooter's rear fork **31** using pivot pin **43** which is threaded through the holes in the rear fork **31** and the bottom holes **55** formed in the bracket **53**. With reference to ~~FIGS. 4, 5, 6 and 7~~ Figs. 2 and 4, the bracket **53** is ~~hingably~~ hingedly attached to the scooter's rear fork **31** with the pin **43** so that clockwise rotation of the thumb screw **67** against the base platform **3** causes the bracket **53** to rotate rearwardly, which in-turn causes the motor's spindle **61** to engage the external surface of the scooter's rear wheel **33**. Thus, activation of the motor **59** causes the rear wheel **33** to rotate. Conversely, counter-clockwise rotation of the thumbscrew **67** causes the force of the motor spindle **61** against the surface of the rear wheel **33** to be reduced

enabling the rider of the scooter ~~1~~ **50** to operate the scooter ~~1~~ in a non-motorized mode. ~~As illustrated in FIG. 13, in~~ In an additional embodiment, instead of using a thumbscrew **67**, a spring is used to bias the bracket **53** and motor **59** rearwardly against the scooter's rear wheel **33**.

[0030] With reference to ~~FIG. 2~~ Fig. 2, the battery pack **71** and relay **83** are mounted within a channel typically formed on the underside of the scooter's base platform **3**. After the battery pack **71** and relay **83** are mounted to the scooter's underside using typical fasteners known to those skilled in the art such as glue or Velcro, the battery cover **73** is also attached to the underside of the scooter's base platform **3** using Velcro or the like to protect the battery pack **71** and relay **83** from damage during riding. As shown in ~~FIG. 2~~ Fig. 3, the battery pack **71** is connected to the relay **83** and in-turn to the motor **59** through high current wires **84** and connectors **79** and **81**.

[0031] The control circuit **85** is installed on the scooter ~~1~~ **50** by routing signal wire ~~89~~ **87** through battery cover **73** to the front of the scooter's base platform **3** and then upwardly along the side of the scooter's head tube **15**. Preferably, the wire ~~89~~ **87** is affixed in place using adhesive backed tie bases **101** and cable ties **103**. ~~With reference to FIGS. 1, 2 and 8, the~~ The contact strip **91** is affixed in annular fashion to the top of the head tube **15** using double stick tape or the like to form an electrical ring on the head tube's upper exterior surface. Meanwhile, the collar **105** is affixed to the lower extremity of the rotable steering column **7** so that the lower portion of the collar extends concentrically around the contact strip **91**. Attached to the interior of the collar **105** is the contact bar **95** which is positioned to slidably contact the side of the contact strip **91** as the steering column **7** and collar **105** are rotated. The single wire **89** extending from the contact bar **95** is routed upwardly along the length of the steering column **7**, and preferably is coiled along the steering column's upper tube **9** so that the upper tube **9** may still telescopically extend and retract within the steering column's

lower tube **11**. The on/off button **99** is then affixed to the handlebars **5** using ~~bracketry~~ a bracket or tie wraps as could be constructed by those skilled in the art.

[0032] The on/off button **99** is preferably constructed so that depression of the button causes a current to flow through the switch, with the removal of pressure from the on/off button **99** causing the circuit to open. As would be understood by those skilled in the art, the signal wires **89** and **87** ~~97~~, in cooperation with contact strip **91**, in rotational contact with contact bar **95** provide a first electrical path to the on/off button **99** from the relay **83**. Providing a second electrical path from the on/off button **99** to the relay **83** is the frame of the scooter ~~1~~ **50** itself. To this end, the handlebars **5**, steering column **7**, bearings **17**, head tube **15**, hinge assembly **21** and base platform **3** are all constructed of electrically conductive metal such as stainless steel. One of the terminals of the on/off button **99** is electrically connected directly to the underside of the platform base **3**. Thus, depression of on/off button **99** causes a circuit to close through signal wire **89**, contact strip **91**, contact bar **95**, signal wire ~~97~~ **87**, handlebars **5**, steering column **7**, bearings **17**, head tube **15**, hinge assembly **21** and base platform **3** causing the relay **83** to close, permitting current to flow from battery pack **71** to the motor **59**.

[0033] Once the components of the kit **51** have been installed on the scooter **1**, a motorized scooter **50** is thus provided. Depressing the on/off button **99** energizes the motor **59** causing the rear wheel **33** to rotate. Braking is provided by depressing the fender foot ~~break~~ brake **63** against the rear wheel **33**.

[0034] ~~Preferred~~ The preferred embodiment is the complete kit ~~FIG. 14 and FIG. 15~~ **51** (Fig. 3) ready for consumer purchase which includes ~~FIG. 14,~~ battery charger **150**, twelve volt adapter **151**, spring installer **152**, pin installer **153** ~~and FIG. 15, butterfly motor bracket **154**~~ and all necessary wiring and relay installations.

[0035] Although the present invention has described with reference to the preferred embodiments, workers skilled in the art will recognize that changes may

be made in form and detail without departing from the spirit and scope of the invention.

I claim:

1. Existing folding lightweight mini scooter presently which there are over 25 separate brands on the market as of the summer of 2001. This retrofit kit can be used on most all the brands. The invention is presented on the "Razor" style lightweight collapsible type scooter. This retrofit kit will provide far greater enjoyment and versatility for the owners and a much broader range of uses.

2. The retrofit kit in claim 1, can be installed with minimum skill and equipment.

3. The kit in claim 2 will include motor bracket, NiCad batteries, mini electric motor, wiring, rotating contact show to allow handle bar movement. All wiring and relays, battery tray and charging system.

4. The retrofit kit in claim 3 when install the rider will engage motor contact with positive lock mechanism by thumb screw, butterfly lever or cam lock, which will direct force from a small pinion on motor to rear wheel. Rider will push start button or transmitter button; push scooter with foot and motor will pick up current from relay and be propelled forward. When battery is exhausted rider will recharge with provided charger.

ABSTRACT

A motorized retrofit kit for lightweight collapsible mini scooter is ~~described as~~ a complete conversion for a lightweight push scooter to a motor driven unit ~~units~~. Owners of existing scooters can install a mini electric motor battery system, wiring and on/off button ~~to drive rear wheel~~ with limited skills and equipment to drive the rear wheel of the scooter.

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